



## Two new species of the genus *Sorolopha* Lower (Lepidoptera: Tortricidae) from northern Thailand

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### Abstract

Two new species of *Sorolopha* Lower (i.e., *S. suthepensis*, **n. sp.**, and *S. undula*, **n. sp.**) are described and illustrated from male specimens collected in agricultural areas and natural forest in Doi Suthep-Pui National Park, Chiang Mai Province, Thailand.

**Key words:** Doi Suthep-Pui National Park, Khun Chang Khian Highland Agricultural Research Station, new species, Olethreutinae, Olethreutini

### Introduction

*Sorolopha* was established by Lower (1901) with *Sorolopha cyclotoma* Lower, 1901 from Australia as the type species. The genus is characterized by conspicuously coloured forewings, often greenish or brownish grey and pink, frequently with a large roundish subapical mark, and by male genitalia with extremely long and pendant socii. Nineteen species of *Sorolopha* have been reported from Thailand: sixteen by Kawabe (1989), two by Pinkaew (2007), and one by Promwong and Pinkaew (2011). Field work to establish the diversity of olethreutine moths was undertaken in different habitat types of the Doi Suthep-Pui National Park, Chiang Mai Province, during 2013–2014. The two new species of *Sorolopha* described herein were collected in the Highland Agricultural area of Khun Chang Khian Highland Agricultural Research Station (Fig. 1) and in natural forest of Doi Suthep-Pui National Park (Fig. 2). Both new species share the conspicuous character of asymmetrical valvae in the male genitalia. In his treatment of *Sorolopha*, Diakonoff (1973) remarked that the two known males of his *sphaerocopa* group of species, *S. asphaeropa* Diakonoff, 1973, from southern New Guinea and *S. sphaerocopa* Meyrick, 1930, from northern Vietnam (as Tonkin) and Indonesia, both have asymmetrical valvae. Kuznetsov (2003) added *Sorolopha asymmetrana* Kuznetsov, 2003, from Vietnam; and with the two new species from Thailand, *S. suthepensis* and *S. undula*, the *sphaerocopa* group now comprises five species with asymmetrical valvae.

### Materials and Methods

Specimens used in the present study are all from the Kasetsart Kamphaeng Saen Insect Collection (KKIC). A Leica MZ95 stereomicroscope was used for examination and specimen measurement and a Leitz Dialux 20 compound microscope was used to examine the genitalia. Forewing length was measured from the outer edge of the tegula at wing base to the outermost edge of the fringe scales at apex. Genitalia preparation methods were adapted from Common (1990). Terminology for forewing pattern and genitalic structures follows Horak (1991, 2006).



**FIGURES 1–2.** Collecting sites in the Doi Suthep-Pui National Park. Fig. 1. Agricultural area at the Khun Chang Khian Highland Agricultural Research Station. Fig. 2. Natural forest at the Pha Dum National Park Unit1.

***Sorolopha suthepensis* Patibhakyothin and Pinkaew, n. sp.**

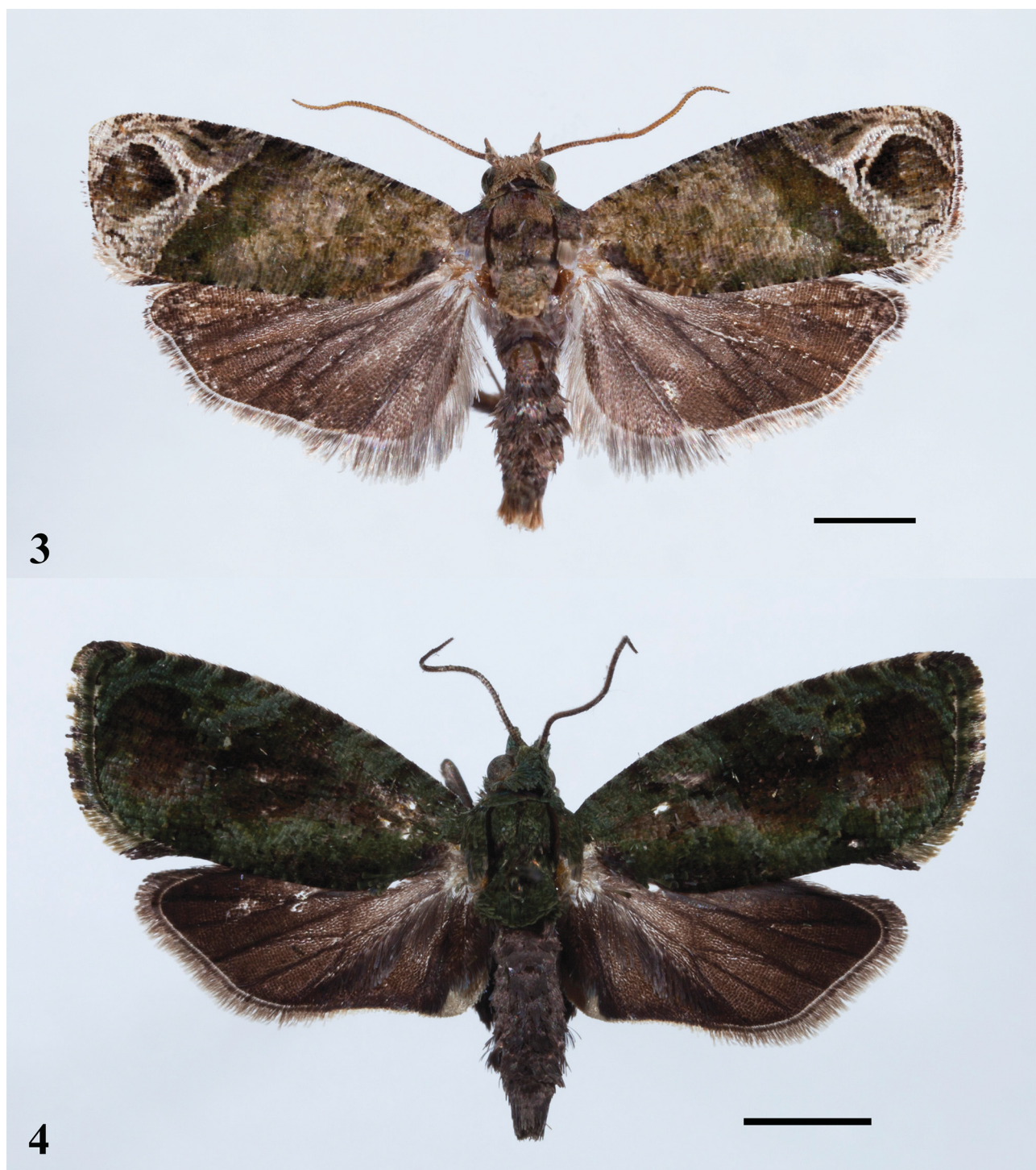
Figs. 3, 5, 7

**Diagnosis.** This species is most similar to *S. asphaeropa* in the shape of the asymmetrical valva and the cucullus, having 2–3 strong spines along the edge of the ventral process, but differs in having a less angled ventral margin of the left sacculus than *S. asphaeropa*, the right sacculus without strong spiniform setae towards valva neck as in *S. asphaeropa*, and with the dorsal lobe of the cucullus elongate rather than round.

**Description.** Head: Upper frons and vertex light brown, lower frons yellowish white to pale brown; antenna extending to middle of forewing, brown; labial palpi porrect, sinuate, long, first segment short, pale brown, second segment long, slightly expanded posteriorly, light brown, third segment stout, rather short, brown.

Thorax: Pronotal collar brown; thorax smooth, light brown with irregular, transverse, dark brown band medially, with light brown posterior scale tufts; tegulae brown but paler on posterior 1/3; legs unmodified. Forewing (Fig. 3) subrectangular, length 7.2–7.3 mm in male; costa lightly and evenly curved except from more strongly curved apex, with well developed strigulae as small light brown streaks alternating with dark brown along costa; termen slightly oblique; ground color light brown mixed with greenish brown, with small, dark brown spots along dorsum, with an oblique band running from middle of costa to near tornus, dark brown mixed with greenish brown and with distinct, nearly straight apical margin edged with white scales nearly to costa, apical 1/3 of wing from  $R_4$  to tornus with greyish white ground color, with a large roundish subapical mark extending from between  $R_4$  and  $R_5$  to near  $CuA_1$  and from basal 1/3 of  $M_1$  to termen, dark brown, surrounded by oblique lines and short, longitudinal, greyish brown lines mixed with dark brown. Underside brown, costa with small blackish dots. Hindwing brown, paler towards base, with long, hairlike scales along 3A. Underside light brown except for yellowish brown area from costa to  $Sc+R_1$ .



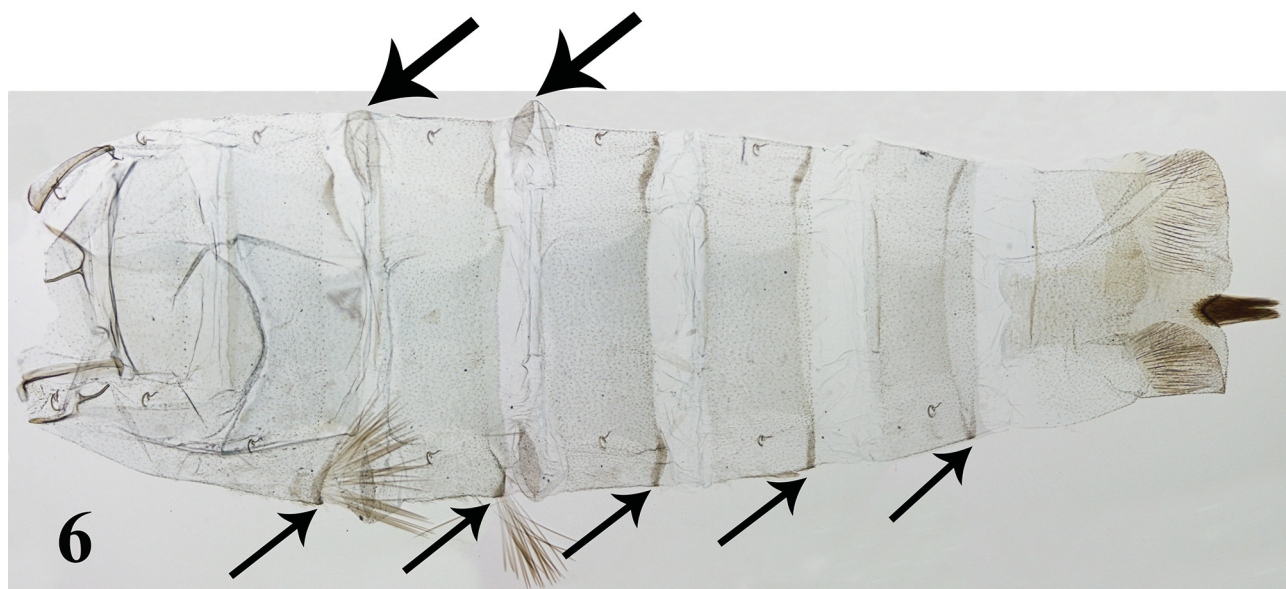


**FIGURES 3–4.** Adults of *Sorolopha* spp. (scale bar=2 mm). Fig. 3. *Sorolopha suthepensis* **n. sp.** (Holotype male, np6438). Fig. 4. *Sorolopha undula* **n. sp.** (Holotype male, np6437).

Abdomen: Sternum 8 (Fig. 5) with expanded, folded membranous lobe, with tuft of long bristles on the margin of deep median excavation and on posterolateral corners. Male genitalia (Fig. 7) with tegumen subtriangular, moderately sclerotized, with dense scale sockets laterally; uncus small, rounded; socii long, slender, slightly curved, pendant from base of uncus to middle length of tegumen, outer margin densely setose, denser at clavate apex; gnathos with two lateral, moderately sclerotized bands fused with sclerotized ventral surface of subscaphium; vinculum weakly sclerotized; juxta small, caulis moderately long; anellus surrounding base of phallus; phallus long, slender, evenly curved, roughly parallel-sided to apex, without cornuti; valvae asymmetrical, with large basal excavation; right sacculus with ventral margin weakly and evenly curved, left sacculus with ventral margin much

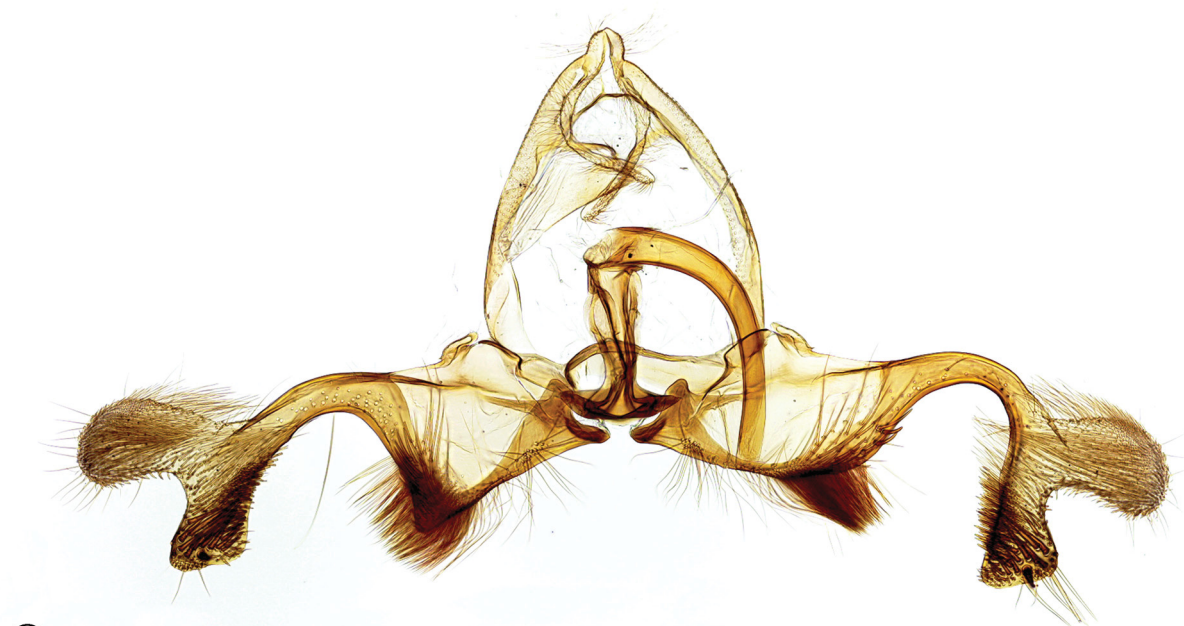
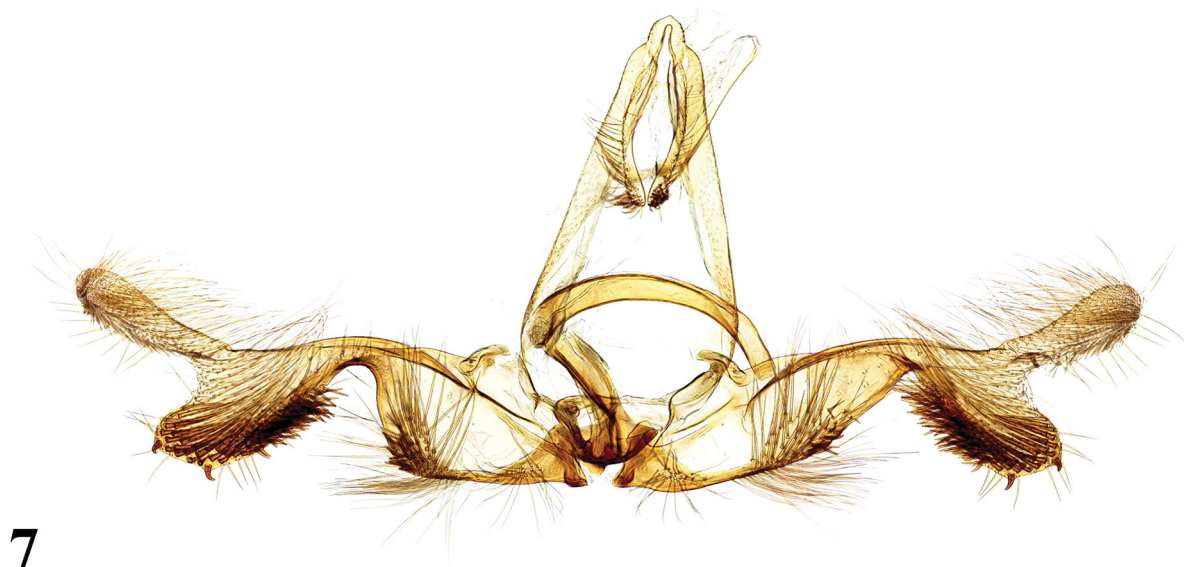


more sharply curved, nearly rounded-rectangular; saccus on both sides with group of moderately short setae basally, medially with long, moderately dense setae and a group of short spines; neck of the valva narrow, with ventral margin deeply sinuate; cucullus densely setose, bilobed, dorsal lobe elongate, gradually widening from narrow base to rounded apex, ventral lobe widest at base with rounded apex, with dense long spiniform setae and 2–3 curved spines along margin.



**FIGURES 5–6.** Abdomen of *Sorolopha* spp. Fig. 5. *Sorolopha suthepensis* **n.sp.** (Holotype, slide NP2279), last segment. Fig. 6. *Sorolopha undula* **n. sp.** (Holotype, slide NP2278), complete integument, arrows indicate scale sockets and sex scales.





**FIGURES 7–8.** Male genitalia of *Soro-lopha* spp. Fig. 7. *Soro-lopha suthepensis* n. sp. (Holotype, slide NP2279). Fig. 8. *Soro-lopha undula* n. sp. (Holotype, slide NP2278).

Holotype: ♂, Thailand, Khun Chang Khian R.St., 18°50'25"N, 98°53'53"E, 1,338 m, [Doi Suthep-Pui N.P.], Chiangmai Prov., N. Patibhakyothin, 25 Jul 2014, np6438, ♂ genitalia slide NP2279. Deposited in KKIC.

Paratype: ♂, Thailand, Pha Dum N.P. Unit1, Doi Suthep-Pui N.P., 18°45'33"N, 98°53'28"E, 1,412 m, Chiangmai Prov., N. Patibhakyothin, 31 Mar 2014, np6326, ♂ genitalia slide NP2231. Deposited in KKIC.

**Etymology.** The specific name *suthepensis* refers to the name of the type locality, Doi Suthep-Pui National Park.

**Distribution.** Northern Thailand.

***Sorolopha undula* Patibhakyothin and Pinkaew, n. sp.**

Figs. 4, 6, 8

**Diagnosis.** The male genitalia of this species differs from those of other species with asymmetrical valvae by the subtriangular shape of the left sacculus with a sharply pointed ventral margin and a longer and more strongly curved neck.

**Description.** Head: Lower frons pale green; upper frons and vertex greyish green; antenna extending to near middle of forewing, brown; labial palpi moderately long, porrect; first segment short, pale green; second and third segment greyish green, second segment lightly curved, slightly dilated apically, with small terminal segment.

Thorax: Pronotal collar greyish green; thorax and posterior scale tufts greyish green; tegulae greyish green mixed with light brown scales posteriorly; hind legs unmodified, light brown contrasting with blackish scales on inner side. Forewing (Fig. 4) broad, subtrapezoidal, length 6.3 mm in male ( $n = 1$ ); costa evenly curved, with well developed strigulae as small greyish green streaks alternating with blackish along costa; termen slightly oblique; ground colour greyish green, with large, indistinct blackish patch extending from basal 2/5 to termen at  $M_2$  and from near costa to near  $CuA_2$ ; with blackish suffusion along dorsum to before termen. Underside pale brown with indistinct costal strigulae. Hindwing modified, with sinuate margin and projecting anal lobe, brown except for white margin of anal angle, with patch of long brown scent scales reaching beyond cubital pecten to  $CuA_1$  near outer margin; anal region enlarged, thickened, sinuate, anal margin folded upwardly, covered with modified scent scales between  $1A+2A$  and  $3A$  and with long, pale brown hairlike scales between  $3A$  and anal margin; anal angle covered with short, appressed white scales. Underside pale brown.

Abdomen: Tergum 3, 4, 5, 6 and 7 (Fig. 6) with scale tufts on posterolateral margin (thin arrows), with lateral patch of scale sockets in a shallow membranous pocket between tergum 3–4 and 4–5 (thick arrows), sternum 8 with expanded, folded membranous lobe, with tuft of long bristles on the margin of median excavation. Male genitalia (Fig. 8) with tegumen subtriangular moderately sclerotized, with dense scale sockets laterally; uncus small, rounded, densely setose; socii long, slender and curved, pendant from base of uncus to mid length of tegumen, densely setose towards lightly clavate apex; gnathos forming two lateral, moderately sclerotized, narrow bands fused with sclerotized ventral surface of subscaphium; vinculum weakly sclerotized; juxta small; caulis moderately long; anellus surrounding base of phallus; phallus long, slender, strongly curved in middle, slightly dilated towards base, without cornuti; valvae asymmetrical; right sacculus evenly curved, with large semicircular basal excavation; left sacculus with acutely projecting ventral angle, with subtriangular basal excavation; sacculus on both sides with moderately dense, long setae basally extending to median patch of spiniform setae mixed with spines, ventromedially with a dense large patch of long bristles; valva neck long, slender, more curved on right than on left; cucullus bilobed, dorsal lobes symmetrical, slightly widening to widest point below rounded apex, with densely setous; ventral lobes unequal, with dense spines on inner surface and widening to truncate apex with a single, short, curved, strong spine medially; ventral lobe on right side with narrower base than on left one.

Holotype: ♂, Thailand, Khun Chang Khian R.St.,  $18^{\circ}50'25''N$ ,  $98^{\circ}53'53''E$ , 1,338 m, Chiang Mai Prov., N. Patibhakyothin, 25 Jul 2014, np6437, ♂ genitalia slide NP2278. Deposited in KKIC.

**Etymology.** The specific epithet *undula* means wave, referring to the sinuate margin of the hindwing.

**Distribution.** Northern Thailand.

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